

**TWO NEW SPECIES OF *POLYRHACHIS* FR. SMITH
(HYMENOPTERA: FORMICIDAE: FORMICINAE) FROM
AUSTRALIA, BASED ON FORMERLY QUADRINOMINAL TAXA**

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Abstract

Two species of the genus *Polyrhachis* Fr. Smith, 1857, originally described as quadrinomial infrasubspecies, are redescribed as new species, viz: *P. incerta* sp. n. [= '*Polyrhachis (Campomyrma) micans* r. *ops* var. *rufa*' Crawley] and *P. cydista* sp. n. [= '*Polyrhachis (Charomyrma) hookeri* r. *obscura* var. *bellendenensis*' Forel]. Both are illustrated and characters separating them from closely similar taxa are given. Their known distributions and nesting habits are summarised. A note on *P. micans* Mayr [= '*Polyrhachis (Campomyrma) micans* st. *ops* var. *dentinasis*' Santschi] is included.

Introduction

In his paper on infrasubspecific names of Australian ants, Taylor (1986) listed 48 species described by earlier authors as quadrinomial entities. Five applied to the genus *Polyrhachis* Fr. Smith. However one of them, '*Polyrhachis rastellata* r. *laevior* v. *pilosa*' Forel, 1902, had already been raised to specific rank by Donisthorpe (1938). Kohout (1989) later described *Polyrhachis foreli* Kohout and referred to it the material of the unavailable name '*Polyrhachis (Myrma) relucens* r. *andromache* v. *andromeda*' Forel, 1915 (and also '*Polyrhachis (Myrma) relucens* ssp. *decepiens* var. *papuana*' Emery, 1897 from New Guinea). The specimens related to the unavailable name '*Polyrhachis (Campomyrma) micans* st. *ops* var. *dentinasis*', described by Santschi (1920), are considered here to be synonymous with *Polyrhachis micans* Mayr, 1876.

The two remaining quadrinomial names still featured on the list of Australian *Polyrhachis* (viz. '*Polyrhachis (Campomyrma) micans* r. *ops* var. *rufa*' Crawley, 1921 and '*Polyrhachis (Charomyrma) hookeri* r. *obscura* var. *bellendenensis*' Forel, 1915) are considered unavailable under article 45.5.1 of the International Code of Zoological Nomenclature (1999), which states that 'A name that has infrasubspecific rank under the provisions of this Article cannot be made available from its original publication by any subsequent action (such as 'elevation in rank') except by a ruling of the Commission'. However, the taxa represented by both quadrinomial names are distinct species and, in order to clean up the last nomenclatural anomalies within the Australian *Polyrhachis*, I hereby describe them as new species.

Both newly described species are relatively rare and until quite recently were known only from the specimens of the original series. However, intensive collecting in recent years, including an increasing number of environmental studies, has produced specimens of many poorly known, previously described species of *Polyrhachis*, as well as a wealth of new species. For example, the

number of undescribed Australian species in the two largest Australian subgenera, *P. (Campomyrma)* Wheeler and *P. (Chariomyrma)* Forel, to which the species described below belong, has risen dramatically and the actual fauna in both subgenera is likely to be three times the number of currently described species.

Methods

Photographs were taken by Dr Yoshiaki Hashimoto (MNHA) with an Olympus SZX12 stereomicroscope and Olympus DP70 digital camera and the digital images processed using Helicon Focus (Mac OSX version) and Photoshop CS2 (Adobe Systems Inc., USA) software. All photographs represent the primary types.

Standard measurements (in mm) and indices follow those of Kohout (2006): TL = Total length (the necessarily composite measurement of the outstretched length of the entire ant measured in profile); HL = Head length (the maximum measurable length of the head in perfect full face view, measured from the anterior-most point of the clypeal border or clypeal teeth, to the posterior-most point of the occipital margin); HW = Head width (width of the head in perfect full face view, measured immediately in front of the eyes); CI = Cephalic index ($HW \times 100/HL$); SL = Scape length (length of the antennal scape, excluding the condyle); SI = Scape index ($SL \times 100/HW$); PW = Pronotal width (width of the pronotal dorsum measured at the bases of the pronotal spines, or across the humeri in species without spines); MTL = Metathoracic tibial length (maximum measurable length of the tibia of the hind leg). Measurements were taken using a Zeiss (Oberkochen) SR stereomicroscope with an eyepiece graticule calibrated against a stage micrometer.

Abbreviations. General: Bch – Beach; Ck – Creek; NP – National Park; rf. – rainforest; w – worker/s; xing – crossing. Collectors: ANA – A.N. Andersen; BBL – B.B. Lowery; CJB – Chris J. Burwell; RJK – R.J. Kohout; SKR – S.K. Robson. Institutions (with names of cooperating curators): ANIC – Australian National Insect Collection, Canberra (Dr S.O. Shattuck); BMNH – The Natural History Museum, London, UK (B. Bolton, Ms K. Goodger, Ms S. Ryder); MCZC – Museum of Comparative Zoology, Harvard University, Cambridge, MA, USA (Dr S.P. Cover); MHNG – Muséum d'Histoire Naturelle, Geneva, Switzerland (Drs C. Besuchet, I. Löbl, B. Mertz); MNHA – Museum of Nature and Human Activities, Sanda, Hyogo, Japan (Dr Yoshiaki Hashimoto); NHMB – Naturhistorisches Museum, Basel, Switzerland (Drs M. Brancucci, D.H. Burckhardt); NMNH – National Museum of Natural History, Smithsonian Institution, Washington, DC, USA (Dr T.R. Schultz); NRMS – Naturhistoriska Riksmuseet, Stockholm, Sweden (Drs K.-J. Hedquist, F. Ronquist, B. Viklund); OXUM – Hope Entomological Collections, University Museum, Oxford, UK (Drs C.O'Toole, D. Mann); QMBA – Queensland Museum, Brisbane (Dr C.J. Burwell).

Systematics

Genus *Polyrhachis* Fr. Smith, 1857

Polyrhachis Fr. Smith, 1857: 58. Type species: *Formica bihamata* Drury, 1773, by original designation.

Subgenus *Campomyrma* Wheeler, 1911

Campomyrma Wheeler, 1911: 860 (as subgenus of *Myrma* Billberg, 1820; = *Polyrhachis* Fr. Smith, 1857). Type species: *Polyrhachis clypeata* Mayr, 1862 (junior synonym of *Polyrhachis exercita* Walker, 1859), by original designation.

Polyrhachis incerta sp. n.

(Figs 1, 3-4)

'*Polyrhachis (Campomyrma) micans* r. *ops* var. *rufa*' Crawley, 1921: 97. Original material: workers, QUEENSLAND, Townsville, 11-12.xii.1902 (F.P. Dodd), ANIC, BMNH, MCZC, OXUM, QMBA (examined) (unavailable name).

Types. *Holotype* worker, NORTHERN TERRITORY: Kakadu NP, Nourlangie Rock, 12°51'S, 132°49'E, 18.xi.1993, open sclerophyll forest, strays on ground and low vegetation, R.J. Kohout acc. 93.50. *Paratypes*: 3 workers, same data as holotype; 1 worker, same data as holotype except A.N. Andersen coll. Holotype (QMT 152088) in QMBA; 2 paratypes in ANIC, 1 paratype each in BMNH and MCZC.

Additional material examined. NORTHERN TERRITORY: Kakadu NP, Ranger Uranium lease site, vii.1993 (ANA) (w); Groote Eylandt, i.1983 (G. Barrett) (w); ditto, G. Webb Pty Ltd site, 16-19.ix.1991 (G. Webb) (w). QUEENSLAND: original specimens of 'var. *rufa*' (w).

Description. Worker. Dimensions (holotype cited first): TL *c.* 7.96, 7.56-8.32; HL 2.00, 1.87-2.03; HW 1.81, 1.68-1.84; CI 90, 87-92; SL 2.09, 2.00-2.15; SI 115, 115-123; PW 1.47, 1.34-1.50; MTL 2.43, 2.28-2.50 (9 measured).

Mandibles with 5 teeth reducing in length towards base. Anterior clypeal margin widely medially truncate; truncate portion with irregularly, obtusely denticulate corners. Clypeus with blunt, poorly defined median carina; almost straight in profile with shallowly impressed basal margin. Frontal carinae sinuate with moderately raised margins; central area concave with poorly indicated frontal furrow. Sides of head in front of eyes weakly convex, only marginally narrowed towards mandibular bases; behind eyes sides forming rather distinct, narrowly rounded, occipital corners. Eyes moderately convex, in full face view breaking lateral cephalic outline. Ocelli lacking. Pronotal dorsum distinctly wider than long; humeri bluntly angular with margins converging anteriorly towards pronotal collar; lateral pronotal margins subparallel, posteriorly rounding into well impressed, anteriorly bowed promesonotal suture. Mesonotal dorsum with lateral margins converging posteriorly in weakly convex line; metanotal groove poorly indicated. Propodeal margins weakly converging posteriorly, or virtually subparallel in some specimens, terminating in short, upturned, somewhat dorsally flattened,

acute teeth; their inner margins continuous for some distance but failing to meet medially; propodeal dorsum curving into steeply oblique declivity in medially uninterrupted line. Petiole scale-like, slender and more-or-less triangular in lateral view; dorsum armed with a pair of slender, medium length, weakly diverging, acute spines; inner margins of spines contiguous medially, forming rather narrow, 'U'shaped dorsum of petiole; outer margins of spines descending into distinct, dentate angles. Anterior face of first gastral segment flat, marginally higher than full height of petiole, narrowly rounding onto dorsum of gaster.

Head, mesosoma and dorsum of gaster densely and finely reticulate-punctate, with sculpturation on vertex, sides of head and dorsum of mesosoma somewhat organised into weak, irregular, longitudinal striae, with those on mesonotal dorsum diverging posteriorly towards lateral margins of segment. Sides of mesosoma and petiole finely wrinkled. Sides and venter of gaster shagreened.

Mandibles with numerous curved, golden hairs. Anterior clypeal margin medially with several, anteriorly directed, unequal length golden setae and shorter setae fringing margin laterally. A single pair of very short, erect hairs near basal clypeal margin and several hairs on posterior face of fore coxae. Gaster with medium length, mostly posteriorly inclined, golden hairs around apex and along posterior margins of sternites. Very short, closely appressed pubescence in various densities over most dorsal body surfaces and gastral venter.

Distinctly light to medium reddish-brown, with only mandibular teeth, anterior clypeal margin, frontal carinae, pronotal and mesopleural margins, propodeal and lateral petiolar teeth very narrowly bordered with black. Vertex, dorsum of mesosoma along promesonotal suture and sides of mesosoma a shade darker in some specimens.

Sexuals and immature stages unknown.

Remarks. As suggested by the original infrasubspecific name ('*Polyrhachis micans ops rufa*'), *P. incerta* is closely allied to both *P. micans* Mayr, 1876 and *P. ops* Forel, 1907; however, all three species are easily distinguished from each other and from another group of very similar species that includes *P. schwiedlandi* Forel, 1902 and several other, mostly undescribed species. Besides their relatively large size, all these species share a broadly truncate anterior clypeal margin, eyes situated close to the occipital corners of the head and a scale like petiole. In species related to *P. micans*, the petiole is armed with a pair of dorsal, often elongated, acute spines and a pair of usually shorter lateral spines or teeth that may be reduced to blunt angles. In contrast, in species related to *P. schwiedlandi*, the dorsum of petiole is arcuate with a shallow median emargination and a pair of very short lateral spines. However, in several newly discovered species the petiolar dorsum

bears a pair of rather distinct teeth and a pair of short, acute, dorso-posteriorly curved lateral spines, an arrangement not unlike that found in those species related to *P. micans*.

Polyrhachis incerta can be distinguished from *P. micans*, *P. ops* and other closely related species using the following key.

- 1 Petiolar spines with dorsal pair distinctly longer than lateral pair that are often reduced to mere angles 2
 - Petiolar spines more-or-less subequal *P. ops* Forel
- 2 Lateral petiolar spines slender and acute, curved strongly backwards and outwards; propodeum with a pair of dorso-medially flattened, upturned spines *P. micans* Mayr
 - Lateral petiolar spines reduced to short teeth or mere angles; propodeum with a pair of very short teeth or tubercles 3
- 3 Body and appendages light to medium reddish-brown, rarely body bicoloured with parts of head and much of mesosoma black or dark brown..... *P. incerta* sp. n.
 - Body entirely black with appendages often dark reddish-brown 4
- 4 Propodeal dorsum very narrow, about 1.5 times longer than wide with parallel lateral margins *P. prometheus* Santschi
 - Propodeal dorsum wider than long with strongly posteriorly converging lateral margins *P. 'Campo 12'* (undescribed)

Polyrhachis incerta appears to be a very rare species that is currently known from two widely separated regions. The specimens of the type series were taken in Kakadu National Park in the Northern Territory, with additional specimens collected on Grootte Eylandt. The specimens from Queensland were apparently collected on a single occasion by F.P. Dodd at Townsville (see data above). Specimens from both areas are very similar morphologically, but differ distinctly in colour pattern. Specimens from the Northern Territory are more-or-less uniformly reddish-brown, while those from Queensland are distinctly bicoloured, with the sides of head, vertex and most of the mesosoma, except the propodeal declivity, black or very dark reddish-brown. The nest of *P. incerta* is unknown, but the foraging habits of the species suggest it is ground-nesting like other, closely related species such as *P. micans*, *P. 'Campo 12'* and *P. prometheus*. *Polyrhachis incerta* was listed as *P. 'Campo 01'* by Kohout (2000: 190).

***Polyrhachis micans* Mayr, 1876**

Polyrhachis micans Mayr, 1876: 76. Syntype workers, queen. Original localities: AUSTRALIA, QUEENSLAND, Rockhampton, Peak Downs (A. Dietrich), NHMW (examined).



Figs 1-6. *Polyrhachis* spp. (1-2) head in full face view: (1) *P. incerta* sp. n.; (2) *P. cydista* sp. n. (3, 5) dorsal habitus: (3) *P. incerta* sp. n.; (5) *P. cydista* sp. n. (4, 6) lateral habitus: (4) *P. incerta* sp. n.; (6) *P. cydista* sp. n. (All images are of the holotypes and are not to scale).

Polyrhachis (Campomyrma) micans Mayr; Santschi, 1920: 185. Combination in *P. (Campomyrma)*.

'*Polyrhachis (Campomyrma) micans* st. *ops* var. *dentinasis*'. Santschi, 1920: 185. Original locality: QUEENSLAND, Townsville, 11.ii.1902 (F.P. Dodd), NHMB (2 workers and alate queen examined) (unavailable name).

Additional material examined. WESTERN AUSTRALIA: Kimberley region, King Edward R., 15°08'S, 126°08'E, vi.1988 (ANA) (w); ditto, 1.vi.1988 (I.D. Naumann) (w); Kimberley region, Mertens Ck, ix.1993 (S. Morrison) (w). QUEENSLAND: Cape York Pen., 6 km E of Heathlands, 18-22.iv.1992 (G. Cassis) (w); Alehvale Stn, 9 km SE of Croydon, 18°15'S, 142°18'E, 16.x.1976 (RJK acc. 76.59) (w); 50 km NW of Charters Towers, 4.i.1977, dry sclero (BBL) (w); 4 km E of Charters Towers, 13.xii.1976, dry sclero (BBL) (w); Britton Ra., 6 km NNE of Homevale, 21°23'S, 148°33'E, 1-6.iv.1975 (RJK accs 75.155, 156/1) (w); German Ck mine, nr Middlemount, 200 km NW of Rockhampton, 23°00'S, 148°30'E, 1997 (ANA) (w); 6 km N of Mt Archer, nr Rockhampton, 23°17'S, 150°34'E, 4.i.1979 (RJK acc. 79.16) (w); Rundle Ra., 36 km NW of Gladstone, 23°39'S, 150°58'E, 24-30.iii.1975 (RJK acc. 75.136/2) (w).

Dimensions of syntypes (queen cited last): TL *c.* 9.42-9.93, 10.03; HL 2.31-2.43, 2.37; HW 2.09-2.18, 2.00; CI 90, 84; SL 2.37-2.46, 2.25; SI 113, 112; PW 1.93-2.06, 2.28; PPW (w only) 1.15-1.22; MTL 2.90-2.96, 2.87 (2 workers, 1 queen measured).

Remarks. I have examined two workers and a queen of the original series of '*Polyrhachis (Campomyrma) micans ops dentinasis*'. In addition to the original identification tags in Santschi's handwriting, the specimens also bear more recent tags added by R.W. Taylor that identify them as *P. micans* Mayr. I have compared these specimens with the earlier selected vouchers (topotypes) of *P. micans* and found them inseparable. Consequently, the earlier opinion of Taylor (unpublished), who considered both names conspecific, is here confirmed.

Subgenus *Chariomyrma* Forel, 1915

Chariomyrma Forel, 1915:107 (as subgenus of *Polyrhachis* Fr. Smith, 1857). Type species: *Polyrhachis guerini* Roger, 1863, by original designation.

Polyrhachis cydista sp. n.

(Figs 2, 5-6)

'*Polyrhachis (Chariomyrma) hookeri* r. *obscura* var. *bellendenensis*' Forel, 1915: 109. Original material: unique worker, QUEENSLAND, Bellenden Ker (E. Mjöberg), NRMS (examined) (unavailable name).

Types. *Holotype* worker, QUEENSLAND: Mt Hedley, 1-2 km N of Home Rule, 15°45'S, 145°17'E, 200-300 m, 11.vi.1996, rf., R.J. Kohout acc. 96.44. *Paratypes*: 7 workers, queen, same data as holotype. *Holotype* (QMT 152089), *paratype* worker and *paratype* queen in QMBA; 2 *paratype* workers each in ANIC, BMNH and MCZC.

Additional material examined. QUEENSLAND: Home Rule, 15°45'S, 145°17'E, *c.* 200 m, 9-11.vi.1996, rf. edge (RJK & CJB acc. 96.45) (w); Pilgrim Sands, *c.* 1 km

NW of Cape Tribulation, 16°04'S, 145°28'E, <10 m, 12-15.vi.1996 (RJK acc.96.47) (w); McLean Ck, c.19 km SbyW of Cape Tribulation, 16°15'S, 145°26'E, 15.vi.1996 (RJK acc. 96.54) (w); Kuranda, 1.xi.1914 (W.M. Wheeler) (w); ditto, 29.x.1950, rf. (W.L. Brown) (w); Mission Bch., 17°45'S, 146°00'E, 1966 (SKR #799) (w); Rocky Ck xing, 6 km W of Tully, 17°55'S, 145°53'E, 22.ix.1980 (BBL) (w); Broadwater Park, via Ingham, 18°22'S, 145°57'E, 400 m, 3.i.1987 (S. Hamlet) (w); original specimen of 'var. *bellendenensis*' (w).

Description. Worker. Dimensions (holotype cited first) TL *c.* 5.24, 4.28-5.59; HL 1.40, 1.15-1.47; HW 1.31, 1.06-1.37; CI 93, 90-97; SL 1.37, 1.15-1.43; SI 104, 100-109; PW 1.40, 1.18-1.50; MTL 1.40, 1.15-1.50 (27 measured).

Anterior clypeal margin with shallow, medially notched flange, flanked by blunt denticles. Clypeus with blunt median carina, sinuate in profile; basal margin moderately impressed. Frontal carinae sinuate, with raised, laminate margins, separated by rather wide central area; frontal furrow replaced by anteriorly raised, longitudinal carina. Sides of head in front of eyes strongly converging towards mandibular bases; behind eyes immediately rounding into convex occipital margin. Eyes weakly convex, only marginally exceeding lateral cephalic outline in full face view. Ocelli lacking. Mesosoma laterally marginate along its entire length, convex in profile. Pronotal humeri angulate, dorsally concave, with anterior and lateral margins translucent, narrowly raised and widely laminate. Promesonotal suture distinct; mesonotum with lateral margins converging posteriorly; metanotal groove distinct laterally, rather indistinct medially. Propodeum armed with strong, horizontal, laterally and posteriorly curved, acute spines; spines relatively wide and dorsally flattened in basal halves and distinctly narrowed and slender towards tips. Petiole very slender in side view with anterior and posterior faces converging towards rather acute, transversely convex and posteriorly bowed dorsum, armed with a pair of dorsolaterally diverging spines. Anterior face of first gastral segment distinctly higher than full height of petiole, widely rounding onto dorsum of gaster.

Mandibles finely, longitudinally striate. Clypeus irregularly, longitudinally reticulate-striate. Head mostly longitudinally striate, with sides reticulate-rugose. Pronotal dorsum with somewhat wide, inversely 'U'-shaped striae medially and oblique striae across humeral angles. Mesonotal and propodeal dorsa more-or-less longitudinally striate-punctate, with sides and propodeal declivity mostly horizontally wrinkled. Apical halves of propodeal and petiolar spines, anterior and posterior faces and dorsum of petiole, smooth and highly polished. Gaster finely reticulate-punctate.

Mandibles with numerous, relatively long, curved, golden hairs. Anterior clypeal margin with a few longer setae medially and several short setae laterally. Head, mesosoma, petiole and gaster with numerous long hairs, some almost twice as long as greatest diameter of eyes; hairs on head and mesosoma erect or variously curved, those on dorsum of gaster more

posteriorly curved. Antennae and legs with numerous, short to medium length, erect, golden hairs. Very short, mostly suberect, grey and silvery hairs, rather dense on clypeus and propodeal declivity. Closely appressed, mostly silvery pubescence on dorsum of head, mesosoma and petiole, with distinct reddish tint on mesonotal and propodeal dorsa. Gastral dorsum with relatively long, appressed, rich brassy-golden to somewhat coppery pubescence; rather diluted and more silvery pubescence on sides and venter of gaster.

Head, mesosoma and petiole black; antennae, pronotal humeri and legs, including middle and hind coxae, very light orange; fore coxae and subpetiolar process medium reddish-brown, mandibles a shade darker; dorsum of gaster black, sides and venter very dark reddish-brown.

Queen. Dimensions: TL *c.* 6.10; HL 1.47; HW 1.31; CI 89; SL 1.37; SI 104; PW 1.56; MTL 1.49 (1 measured).

Very similar to worker and apart from differences due to full sexuality, including three ocelli, complete thoracic structure and wings, differing as follows: eyes larger; pronotal humeri bluntly angulate with only anterior margins narrowly laminate; mesoscutum wider than long, with widely rounded anterior margin in dorsal view; median line very short; parapsides flat, only very weakly raised posteriorly; mesoscutum in profile with rather low anterior face and flat dorsum; mesoscutellum flat, not elevated above dorsal plane of mesoscutum; propodeum and petiole with spines similar to those in worker, but shorter; dorsum of mesosoma with rather irregular, reticulate-punctate sculpturation; pilosity and colour virtually identical to worker.

Male and immature stages unknown.

Remarks. As suggested by the original infrasubspecific name (*'Polyrhachis hookeri obscura bellendenensis'*), *P. cydista* is very similar to a complex of species including *P. hookeri* Lowne, 1865, *P. lownei* Forel, 1895 and *P. obscura* Forel, 1895. However, all four species can be easily distinguished with the following key.

- 1 Head and mesosoma distinctly metallic green, blue or purple or a combination of these colours *P. hookeri* Lowne
- Head and mesosoma uniformly very dark brown or black 2
- 2 Dorsum of gaster with a distinct longitudinal patch of very dark maroon or purple-coloured, closely appressed pubescence; body with rather irregular, reticulate-rugose sculpturation 3
- Dorsum of gaster without such a patch, with golden or coppery pubescence uniformly distributed over gastral dorsum; body sculpturation generally longitudinally striate-punctate with striae on

pronotal dorsum 'U'-shaped medially and oblique across humeral angles
 *P. cydista* sp. n.

- 3 Propodeal spines relatively short, divergent, weakly elevated from their somewhat broadened bases and dorso-ventrally flattened; gaster reddish-brown, distinctly lighter than dorsum of mesosoma *P. obscura* Forel
- Propodeal spines longer, with their length almost equal to distance between their bases, gently curved, with their tips projecting posteriorly; gaster very dark with distinct green metallescence *P. lownei* Forel

Polyrhachis cydista is a rainforest-dwelling and apparently ground-nesting species, endemic to Queensland's Wet Tropics. It was listed as *P. 'Chario 04'* by Kohout (2000: 193).

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